PATENT
0563-1055

IN THE U.S. PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	Appeal No.
Laure CARBONNE et al.	Conf. 9532
Application No. 10/549,570	Group 3747
Filed May 24, 2006	Examiner Keith Coleman

METHOD FOR SYNCHRONIZING INJECTION WITH THE ENGINE PHASE IN AN ELECTRIC INJECTOR CONTROLLED ENGINE

APPEAL BRIEF

MAY IT PLEASE YOUR HONORS:

1. Real Party in Interest

The real party in interest in this appeal is:

SIEMENS VDO AUTOMOTIVE, 1, AVENUE PAUL OURLIAC, BP1149, F-31036 TOULOUSE CEDEX 1, FRANCE. The assignment was recorded on May 24, 2006 at reel 017680, frame 0250.

2. Related Appeals and Interferences

None.

3. Status of Claims

Claims 1-19 are pending. No claims have been withdrawn of canceled. Claims 1-19 have been finally rejected, from which this appeal is taken.

4. Status of Amendments

A non-final Amendment was filed on December 26, 2007, which amended claims 1-19 in response to the non-final Official Action mailed September 26, 2007.

A final Official Action was mailed on April 4, 2008, which rejected claims 1-19.

No response to the final Official Action mailed on April 4, 2008 was filed.

A Notice of Appeal was failed on July 7, 2008.

Accordingly, the claims under appeal are the rejected claims 1-19 set forth in non-final Amendment was filed on December 26, 2007.

5. Summary of Claimed Subject Matter

Independent claim 1: As is set forth in independent claim 1, the present invention pertains to a method of synchronizing injection with engine phase in an engine with electronic injector control having n cylinders 1, 2, 3, 4, 5, 6 into which fuel is injected directly into each of the cylinders 1, 2, 3, 4, 5, 6 successively in a predetermined sequence (page 2, lines 4-7), the fuel injection being synchronized with a position of a piston in the corresponding cylinder 1, 2, 3, 4, 5, 6 (page 2, lines 7-9), the method including the following steps, performed when the engine is started (page 2, lines 10-11):

- injecting fuel into m cylinders 1, 2, 3, 4, 5, 6 in the predetermined injection sequence when the corresponding pistons, put into motion by means of a starter, are at an end of a compression phase, m being determined in advance as a function of n (page 2, lines 12-15),

- measuring engine speed and/or acceleration (page 2, line 16),

- continuing the injection in the predetermined sequence if the engine speed and/or acceleration exceed a predetermined threshold, the injection being synchronized with the engine phase in this case (page 2, lines 17-20), and

- continuing the injection with a phase change with respect to the preceding injections and with respect to the predetermined sequence, this phase change being a function of n and m, so that the injection is synchronized with the engine phase, in the contrary case (page 2, lines 21-25),

wherein the method does not employ a camshaft sensor (page 1, line 28 to page 2, line 1).

6. Grounds of Rejection to be Reviewed on Appeal

The first ground for review on appeal is whether claims 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13 and 14 are anticipated by MORIKAWA (U.S. Patent 6,138,638) sufficient to support a rejection under 35 USC §102(b).

The second ground for review on appeal is whether claims 5, 7, 13, 14 and 15-19 are unpatentable over MORIKAWA sufficient to support a rejection under 35 USC §103(a).

It is noted that claims 13 and 14 have been included in both rejections under review.

7. Argument

7.1 First Ground: Anticipation Rejection Over MORIKAWA

The present invention pertains to a method of synchronizing injection with engine phase in an engine with electronic injector control having n cylinders, which does not employ a camshaft sensor. The present invention is illustrated, by way of example, in Figure 2 of the application, which is reproduced below.

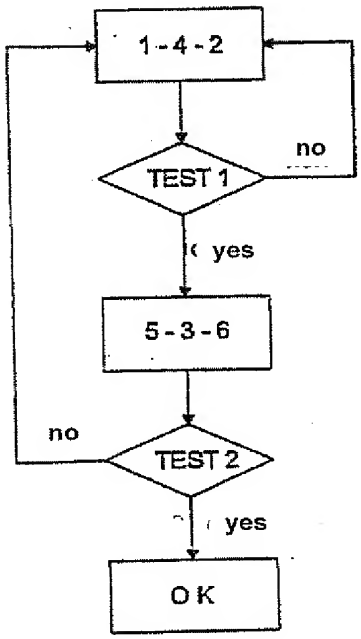

FIGURE 2

As is set forth in claim 1 of the present invention, the method includes the following steps:

- injecting fuel into m cylinders in the predetermined injection sequence when the corresponding pistons, put into motion by means of a starter, are at an end of a compression phase, m being determined in advance as a function of n,
- measuring engine speed and/or acceleration,
- continuing the injection in the predetermined sequence if the engine speed and/or acceleration exceed a predetermined threshold, the injection being synchronized with the engine phase in this case, and
- continuing the injection with a phase change with respect to the preceding injections and with respect to the predetermined sequence, this phase change being a function of n and m, so that the injection is synchronized with the engine phase, in the contrary case,

wherein the method does not employ a camshaft sensor.

MORIKAWA pertains to a system for diagnosing and controlling a high-pressure fuel system for a fuel inection engine. The technology of MORIKAWA is illustrated in Figure 21, reproduced below, which shows a crank angle sensor 39 for a crank rotor 38.

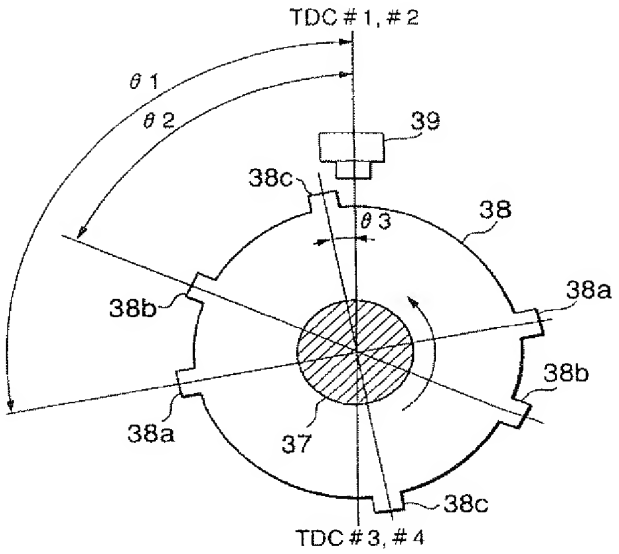

FIG.21

Figure 22 of MORIKAWA, reproduced below, shows a sensor 42 over a cam rotor 41.

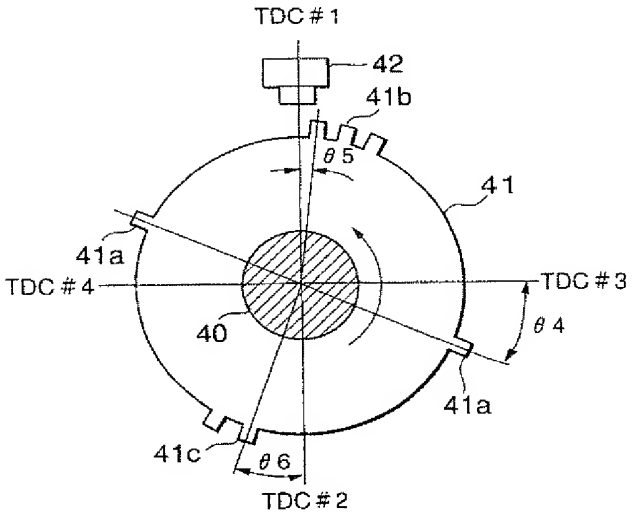

FIG.22

That is, MORIKAWA uses a camshaft sensor, and the exact positioning of the engine is known. In contrast, the present

invention determines the engine position by test. On the other hand, MORIKAWA merely determines the engine position by a basic check of the camshaft sensor output.

MORIKAWA thus fails to teach or suggest each and every element of claim 1 of the present invention.

That is, when alleging anticipation under 35 U.S.C. §102, the entire claim must be considered. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the . . . claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). "[A]ll the claim limitations must be taught or suggested by the prior art." *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All the words of a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

MORIKAWA thus fails to anticipate claim 1 of the present invention. Claims depending upon claim 1 are patentable for at least the above reasons.

In the Response to Arguments at page 7 of the Official Action of April 4, 2008, the Examiner asserts: "With regards to Applicant's argument, 'test' is defined as 'a means of

determining the presence, quality or truth of something', thus Applicant has agreed that the present invention and Morikawa's invention perform the **same function in determining the engine position.**" (Emphasis in original).

By this, the Examiner appears to by applying the function-way-results test of the Doctrine of Equivalents. However, the Doctrine of Equivalents arises in the context of an infringement action and not in the context of determining anticipation.

In an infringement action, if an accused product or process does not literally infringe a patented invention, the accused product or process may be found to infringe under the doctrine of equivalents. The essential objective inquiry is: "Does the accused product or process contain elements identical or equivalent to each claimed element of the patented invention?" *Warner-Jenkinson Co. v. Hilton Davis Chemical Co.*, 117 S. Ct. 1040, 41 USPQ2d 1865, 1875 (1997). In determining equivalence, "[a]n analysis of the role played by each element in the context of the specific patent claim will thus inform the inquiry as to whether a substitute element matches the function, way, and result of the claimed element, or whether the substitute plays a role substantially different from the claimed element." *41 USPQ2d at 1875.*

However, these considerations are not jejeune to an Office rejection for anticipation.

In the Response to Arguments at page 7 of the Official Action of April 4, 2008, the Examiner further asserts: "In addition, Figures 14 and 15 show only using the crankshaft sensor pulses in determining position."

Figures 14 and 15 of MORIKAWA are reproduced below.

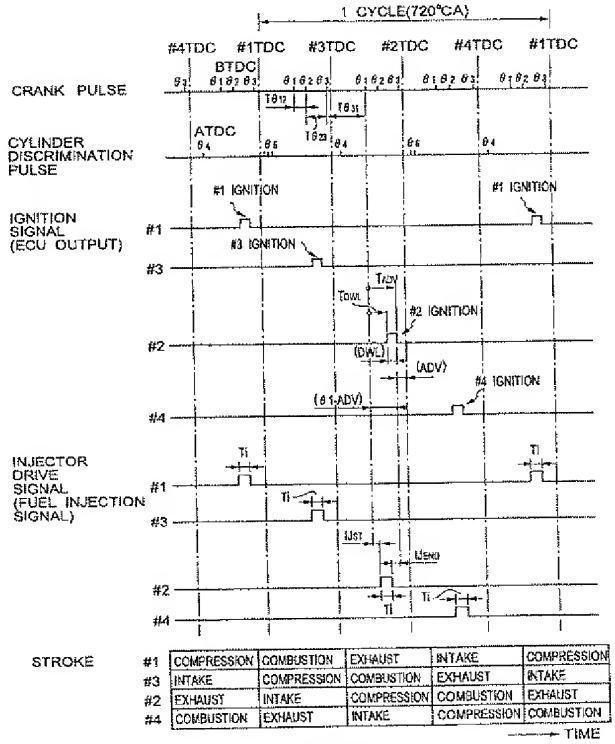

FIG.14

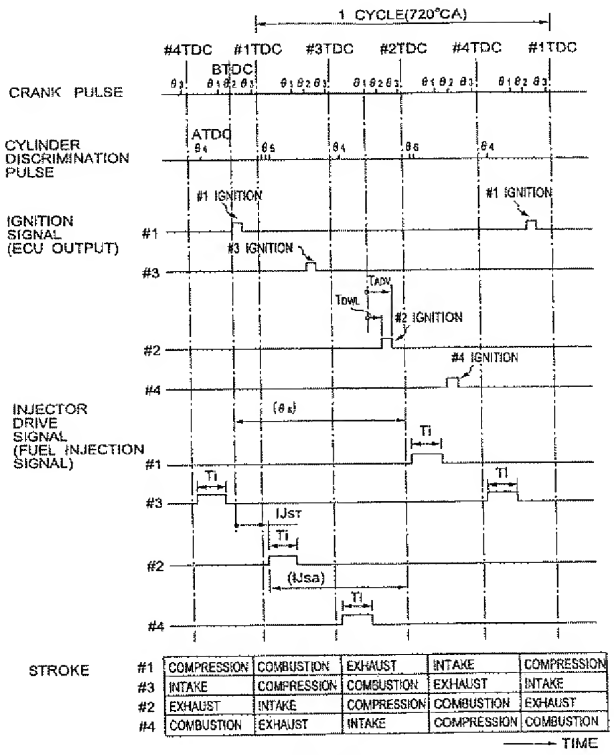

FIG.15

However, even a quick look at these drawing figures clearly show that the two first criteria are:

i) Crank pulse signal (i.e., θ_1, θ_2, θ_3) and

ii) Cylinder discrimination pulse signal (i.e., θ_4, θ_5, θ_6).

The discussion at column 30, line 66 to column 31, line 17 of MORIKAWA explains the origin of θ_1, θ_2, θ_3, θ_4, θ_5, and θ_6:

> As shown in FIG. 21, the crank rotor 38 is formed with protrusions 38a, 38b and 38c on the outer periphery thereof. These protrusions 38a, 38b and 38c are positioned at crank angles θ_1, θ_2 and θ_3 before compression top dead centers (BTDC) for each of cylinders (cylinders #1, #2 and cylinders #3, #4). In this preferred embodiment, θ_1=97° CA, θ_2=65° CA and θ_3=10° CA.
>
> As shown in FIG. 22, the cam rotor 38 is provided with cylinder determining protrusions 41a, 41b and 41c on the outer periphery thereof. The protrusion

> 41a is positioned at a crank angle θ_4 after compression top dead center (ATDC) of cylinders #3 and #4. The protrusion 41b comprises three protrusions, and the first protrusion is positioned at a crank angle ATDC θ_5 of cylinder #1. The protrusion 41c comprises two protrusions, and the first protrusion is positioned at a crank angle ATDC θ_6 of cylinder #2. In this preferred embodiment, θ_4=20° CA, θ_5=5° CA, and θ_6=20° CA.
>
> In accordance with the engine operation, the crank rotor 38 and the cam rotor 41 rotate with the crank shaft 37 and the cam shaft 40.

As a result, the assertion that Figures 14 and 15 of MORIKAWA show only using the crankshaft sensor pulses in determning postion is an erroneous interpretation of the technology of MORIKAWA.

At page 4 (and in the Response to Arguments at page 8) of the Official Action of April 4, 2008, the Examiner refers to Figures 14 and 24 of MORIKAWA and asserts: "When p=0 and after 20 milliseconds, Morikawa's routine ***inherently*** checks the status of synchronization twice." (Emphasis added).

However, accidental results not intended and not appreciated do not constitute anticipation. *Eibel Processing Co. v. Minnesota and Ontario Paper Co.*, 261 US 45 (1923); *Mycogen Plant Science, Inc. v. Monsanto Co.*, 243 F.3d 1316, 1336, 5 USPQ2d 1030, 1053 (2001). Further, the Federal Circuit stated in *In re Robertson*, that "to establish inherency, extrinsic evidence must make clear that the missing descriptive matter was necessarily present in the thing described in the reference, and would be so

recognized by persons with ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949 (Fed. Cir. 1999). Further, it has been held that the mere fact that a certain thing may result from a given set of circumstances is not sufficient, and occasional results are not inherent. *MEHL/Biophile International v. Milgraum*, 192 F.3d 1362, 1365, 52 USPQ2d 1303 (Fed. Cir. 1999).

At pages 8-11 of the Official Action of April 4, 2008, the Examiner marks up copies of Figures 4 and 24 of MORIKAWA and asserts that FHPNG in these drawing figures is a variable. However FHPNG is a high-pressure fuel system NG flag idiciative of the abnormality of the high-pressure fuel system, which is stored in the backup RAM as trouble data. For this, FHPNG is set such that FHPNG←1. See, e.g., MORIKAWA at column 41, lines 32-35, column 42, lines 64-66, column 45, lines 10-11. FHPNG is thus a flag that is set and is not a variable.

MORIKAWA thus clearly fails to anticipate a claimed embodiment of the present invention.

Accordingly, this anticipation rejection over MORIKAWA should be withdrawn.

7.2 Second Ground: Unpatentability Rejection Over MORIKAWA

7.2.1 Interpretation of 35 USC §103

When a rejection is based on 35 USC §103, what is in issue in such a rejection is "the invention as a whole," not just a few features of the claimed invention. Under 35 U.S.C. §103, "[a] patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter *as a whole* would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains." The determination under §103 is whether the claimed invention *as a whole* would have been obvious to a person of ordinary skill in the art at the time the invention was made. See *In re O'Farrell*, 853 F.2d 894, 902, 7 USPQ2d 1673, 1680 (Fed. Cir. 1988). In determining obviousness, the invention must be considered as a whole and the claims must be considered in their entirety. See *Medtronic, Inc. v. Cardiac Pacemakers, Inc.*, 721 F.2d 1563, 1567, 220 USPQ 97, 101 (Fed. Cir. 1983).

In rejecting claims under 35 USC §103, it is incumbent on the Examiner to establish a factual basis to support the legal conclusion of obviousness. See, *In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one of ordinary skill in the pertinent art

would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reasoning must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. *Uniroyal Inc. v. F-Wiley Corp.*, 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988), *cert. denied*, 488 U.S. 825 (1988); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), *cert. denied*, 475 U.S. 1017 (1986); *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. Note, *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992).

The criteria for patentability has been refined by the by the Supreme Court in *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). The Supreme Court in KSR reaffirmed the familiar framework for determining obviousness as set forth in *Graham v. John Deere Co.* (383 U.S. 1, 148 USPQ 459 (1966)), but stated that the Federal Circuit had erred by applying the teaching-suggestion-motivation (TSM) test in an overly rigid

and formalistic way. KSR, 550 U.S. at ___, 82 USPQ2d at 1391. Specifically, the Supreme Court stated that the Federal Circuit had erred in four ways: (1) "by holding that courts and patent examiners should look only to the problem the patentee was trying to solve " (Id. at ___, 82 USPQ2d at 1397); (2) by assuming "that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem" (Id.); (3) by concluding "that a patent claim cannot be proved obvious merely by showing that the combination of elements was 'obvious to try'" (Id.); and (4) by overemphasizing "the risk of courts and patent examiners falling prey to hindsight bias" and as a result applying "[r]igid preventative rules that deny factfinders recourse to common sense" (Id.).

Although the Supreme Court in KSR cautioned against an overly rigid application of teaching-suggestion-motivation (TSM) rationale, it also recognized that TSM was one of a number of valid rationales that could be used to determine obviousness. (According to the Supreme Court, establishment of the TSM approach to the question of obviousness "captured a helpful insight." 550 U.S. at ___, 82 USPQ2d at 1396 (citing *In re Bergel*, 292 F.2d 955, 956-57, 130 USPQ 206, 207-208 (1961)).

7.2.2 MORIKAWA's Failure to Render Prima Facie Unpatentable

The failures of MORKIKAWA to teach the present invention are discussed above. These failures also render MORIKAWA insuficient to allege *prima facie* unpatentability.

At pages 5 and 6, the Official Action of April 4, 2008 acknowledges that MORIKAWA fails to disclose a second measurement of the engine speed and its acceleration. The Official Action then asserts that this would be obtainable by one of ordinary skill from the teachings of MORIKAWA. However, one of ordinary skill would merely read the camshaft sensor output and would not be induced to utilize a second measurement because there is no need.

Further, the failure of any inherency arguments has been discussed above.

Additionally, the Official Action uses the single reference of MORIKAWA, and there is no teaching or inference in the reference itself to turn to a second measurement.

To establish a *prima facie* case of obviousness, "the prior art reference (or references when combined) must teach or suggest all the claim limitations." *MPEP §2143.* In addition, if a reference needs to be modified to achieve the claimed invention "there must be a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention in order to support the obviousness conclusion." *Sibia Neurosciences Inc. v. Cadus Pharmaceutical Corp.*, 225 F.3d 1349, 55 USPQ2d 1927 (Fed. Cir. 2000).

MORIKAWA is thus insufficient to render the present invention, which does not use a camshaft sensor, *prima facie* unptatentable.

This unpatentability rejection over MORIKAWA should thus be withdrawn.

8. Conclusion

The Appellants have demonstrated that the Examiner has failed to successfully allege that the rejected claims are anticipated or *prima facie* unpatentable. It is clear that the claimed method of synchronizing injection with engine phase represents a truly inventive technology. For the reasons advanced above, it is respectfully submitted that all the rejected claims in this application are allowable. Thus, favorable reconsideration and reversal of the Examiner's rejections of claims 1-19 under 35 USC §§102/103, by the Honorable Board of Patent Appeals and Interferences, are respectfully solicited.

Please charge the Appeal Brief fee of $510 to our credit card.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any underpayment or credit any overpayment to Deposit Account No. 25-0120 for any

additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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September 8, 2008

9. Claims Appendix

1. A method of synchronizing injection with engine phase in an engine with electronic injector control having n cylinders into which fuel is injected directly into each of the cylinders successively in a predetermined sequence, the fuel injection being synchronized with a position of a piston in the corresponding cylinder,

the method comprising the following steps, performed when the engine is started:

- injecting fuel into m cylinders in the predetermined injection sequence when the corresponding pistons, put into motion by means of a starter, are at an end of a compression phase, m being determined in advance as a function of n,

- measuring engine speed and/or acceleration,

- continuing the injection in the predetermined sequence if the engine speed and/or acceleration exceed a predetermined threshold, the injection being synchronized with the engine phase in this case, and

- continuing the injection with a phase change with respect to the preceding injections and with respect to the predetermined sequence, this phase change being a function of n and m, so that the injection is synchronized with the engine phase, in the contrary case,

wherein the method does not employ a camshaft sensor.

2. The synchronization method as claimed in claim 1, characterized in that the engine speed and/or acceleration are measured after approximately one revolution of the engine.

3. The synchronization method as claimed in claim 1, for an engine having an even number of cylinders, wherein m = n/2.

4. The synchronization method as claimed in claim 1, wherein a second measurement of the engine speed and/or its acceleration is made after p further injections, p being determined in advance as a function of n and m, to check that the synchronization is correct.

5. The synchronization method as claimed in claim 4, wherein the second measurement of the engine speed and/or its acceleration is made after two actual revolutions of the engine, in other words after n injections of fuel.

6. The synchronization method as claimed in claim 1, wherein the position of the pistons in the cylinders of the engine is determined by a position sensor measuring an angular position of a corresponding engine flywheel.

7. The synchronization method as claimed in claim 1, wherein a dose of fuel injected in a first m injections being smaller than that used in subsequent injections.

8. The synchronization method as claimed in claim 2, for an engine having an even number of cylinders, wherein m = n/2.

9. The synchronization method as claimed in claim 2, wherein a second measurement of the engine speed and/or its acceleration is made after p further injections, p being determined in advance as a function of n and m, to check that the synchronization is correct.

10. The synchronization method as claimed in claim 3, wherein a second measurement of the engine speed and/or its acceleration is made after p further injections, p being determined in advance as a function of n and m, to check that the synchronization is correct.

11. The synchronization method as claimed in claim 2, wherein the position of the pistons in the cylinders of the engine is determined by a position sensor measuring an angular position of a corresponding engine flywheel.

12. The synchronization method as claimed in claim 3, wherein the position of the pistons in the cylinders of the engine is determined by a position sensor measuring an angular position of a corresponding engine flywheel.

13. The synchronization method as claimed in claim 4, wherein the position of the pistons in the cylinders of the engine is determined by a position sensor measuring an angular position of a corresponding engine flywheel.

14. The synchronization method as claimed in claim 5, wherein the position of the pistons in the cylinders of the engine is determined by a position sensor measuring an angular position of a corresponding engine flywheel.

15. The synchronization method as claimed in claim 2, wherein a dose of fuel injected in the first m injections is smaller than that used in subsequent injections.

16. The synchronization method as claimed in claim 3, wherein a dose of fuel injected in the first m injections is smaller than that used in subsequent injections.

17. The synchronization method as claimed in claim 4, wherein a dose of fuel injected in the first m injections is smaller than that used in subsequent injections.

18. The synchronization method as claimed in claim 5, wherein a dose of fuel injected in the first m injections is smaller than that used in subsequent injections.

19. The synchronization method as claimed in claim 6, wherein a dose of fuel injected in the first m injections is smaller than that used in subsequent injections.

10. Evidence Appendix

None

11. Related Proceedings Appendix

None.